



FACT SHEET

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DRINKING WATER AND LEAD

WHAT IS LEAD?

Lead is a substance which can occur by itself as an element or in combination with other ions. Some combinations of lead which have toxic effects are lead acetate, and tetraethyl lead, which is used in gasoline. Lead, the element, is a soft, dull gray, heavy metal. Our words for "plumber" and "plumbing" come from the Latin word for lead, Plumbum.

WHAT IS LEAD USED FOR?

The use of lead dates from the earliest civilizations of man. Lead coins and medallions have been recovered from ancient Egyptian ruins, and lead water pipes were used in ancient Rome. Because it is easily molded and shaped, lead has been used throughout history in tableware, mugs, paints, containers, and bullets.

About 54 percent of the lead produced in this country is used for batteries. Other modern uses of lead include solders, bearings, printing type, brasses, gasoline anti-knock additives, ceramics, inks, paints and varnishes, and radiation shields.

HOW DOES LEAD OCCUR IN THE ENVIRONMENT?

Lead is widespread in the environment. It is present naturally in most soils and can occur in concentrated deposits. However, in the past century, the many human uses of lead have greatly increased lead levels in air, rain, snowfall, surface water and soil and have greatly increased the concentrations in some urban areas.

WHAT LEVELS OF LEAD ARE SAFE?

The amount of lead found in blood is the most commonly used measure of the potential damage to health caused by the buildup of lead in the body. Blood levels above 25-30 micrograms of lead per deciliter of blood (ug/dl) have been associated with definite adverse health effects in children. Levels of 10-15 ug/l, in combination with other factors, have also shown adverse health effects in children.

Since lead has no known beneficial use in the body, and there is increasing evidence that even low levels of lead can be harmful, experts agree that lead exposure should be minimized as much as possible.

WHAT IS MY POTENTIAL EXPOSURE TO LEAD CONTAMINATION?

Normal exposures to lead are from contamination of drinking water, food and air, and ingestion of tobacco smoke. Some persons, however, may be exposed to unusual concentrations of lead in their work. The United States Environmental Protection Agency (U.S. EPA) has determined that lead contamination occurs from the following major sources:

Source of Lead	Lead Exposure Contribution in Children
Drinking Water	20%
Dust and Soil	30-50%
Inhalation Through Air	5%
Food	25-45%

The most common source of lead exposure for humans is through food, but it is usually environmental sources that result in exposures to lead in concentrations which can produce toxic effects. These sources include lead-based paint, lead in air and soil caused by lead-containing auto fuels or industrial emissions, and lead dissolving from pottery which has not been properly glazed. Lead is generally found in higher concentrations in urban environments than in rural areas.

Recently, lead in drinking water has become a concern, though lead rarely occurs naturally at high levels in drinking water sources. The major sources of lead in drinking water are pipes and soldered joints containing lead. The corrosive action of water on distribution systems and residential plumbing systems can cause lead to dissolve from materials in these systems and enter the water.

WHAT ARE THE HEALTH EFFECTS OF LEAD EXPOSURE?

Adults tend to be less susceptible to lead poisoning than children. The usual source of major exposure to adults is from fumes and dust while at work. However, lead poisoning in adults can be very serious if left untreated. Symptoms include loss of appetite, weight loss, insomnia, headache, and abdominal, muscle, or joint pain. If exposure has not been excessive or prolonged, these symptoms may disappear when exposure ceases. Prolonged exposure to lead can cause permanent nerve damage leading to a condition known as "wrist drop," an inability to extend the hand. Excessive lead has also been known to affect reproduction and cause elevated blood pressure.

Children, particularly those under the age of 2, and developing fetuses, are most seriously threatened by lead. Lead may cause permanent damage to the developing nervous system, leading to learning, behavioral or psychological problems. With higher lead exposures, mental retardation can occur. Children with pica, an abnormal tendency to chew on or eat nonfood materials (such as paint chips, toys, and dirt), may be especially at risk for lead poisoning. Children with nutritional problems, such as iron or calcium deficiencies, may absorb more lead and have more serious adverse health effects. In both children and adults, lead can cause anemia, kidney damage and digestive problems.

HOW IS LEAD REGULATED?

The amount of allowed lead in paints and various other consumer products is limited by the Consumer Products Safety Commission.

The Clean Air Act Amendments of 1970 require significant reduction in lead auto emissions. As a result of regulations imposed by U.S. EPA and the States, more than half the gasoline used in this country is now lead free.

The Safe Drinking Water Act Amendments of 1986 ban further use of lead pipe with more than 8 percent lead for drinking water plumbing. The use of solder and flux with more than 0.2 percent lead is also banned in new plumbing or repairs to plumbing that supplies drinking water.

HOW CAN LEAD GET IN MY DRINKING WATER?

Very little lead, if any, is usually present in drinking water sources. The principal source of lead in drinking water is caused by the internal corrosion of lead plumbing material in the water distribution system or home plumbing system. Such materials include lead solder, flux, lead pipes, and alloys containing lead, including brass faucets and bronze fittings.

Up through the early 1900s, it was common practice in some areas of the country to use lead pipes for interior plumbing. Also, lead piping was often used for the service connections that join building piping to the public water system water mains. Plumbing installed before 1930 is most likely to contain lead.

Since the 1930s, interior plumbing materials have usually been galvanized iron or copper pipe. In recent years, plastic pipe has also been allowed in some areas. Copper pipe, when used, has generally been joined with solders containing 50 percent tin and 50 percent lead. This solder has been popular with plumbers because it is relatively inexpensive and easy to apply. Although relatively little solder is exposed on the pipe interior on a well-made joint, experience in the United States and abroad indicates that significant amounts of lead can leach into water from lead solder joints.

Available data indicate that the release of lead from soldered joints occurs chiefly in newly installed plumbing conveying corrosive waters, and decreases to relatively low levels after about 5 years in water that is not excessively corrosive.

The release of lead from soldered copper pipe joints may also be caused by galvanic corrosion. Flux used in the soldering process is suspected to act as an electrolyte, contributing to the electrolytic corrosion of the solder.

In general, lead levels observed are highest in water that has the longest contact time with the plumbing. The highest levels are usually found in faucets that are seldom used, or from first-draw samples in the morning.

HOW CAN I DETERMINE WHETHER LEAD PIPE OR SOLDER HAS BEEN USED IN MY HOME?

Lead is a very soft, dull gray metal. A key or screwdriver can be used to scratch the surface of the pipe or soldered joint. If the metal scratches easily and appears bright silver, the pipe or solder is most likely lead. Contact a licensed plumber if you have further questions about your plumbing material or wish to consider replacement of lead in your plumbing system.

DOES THE AGE OF MY HOME MAKE A DIFFERENCE?

New homes that were plumbed with copper pipe and 50-50 solder, or older homes plumbed with lead pipe, are most likely to expose residents to a higher lead concentration in drinking water. Scientific data indicate that new homes pose a greater risk of lead contamination, but, if the water is not excessively corrosive, lead leaching decreases over time as a coating of calcium builds up inside the piping. It can take from 3 months to 5 years to develop a calcium carbonate coating on the piping. Until that coating is in place, lead from the pipe or solder is more likely to leach into the drinking water in the plumbing system.

ARE THERE PRECAUTIONS I SHOULD TAKE WHEN I MOVE INTO A NEWLY CONSTRUCTED HOME?

Be sure that the plumber uses lead-free solder and pipe during construction. Before you move in, remove all screens from faucets, and allow the water to run for at least 15 minutes to remove any solder droppings and filings from the plumbing. Check your faucet screens frequently for the first month or two until all small debris has been flushed from the system.

CAN I DETECT CORROSION IN MY PLUMBING SYSTEM?

Water that is discolored red or greenish gray may indicate corrosion. Frequent leaks or small holes in plumbing are also indicators that corrosion is occurring. Make sure that no electrical equipment is grounded to water pipes because this practice may increase corrosion within the plumbing system. If there is electrical grounding to the plumbing, call a licensed electrician to reroute the grounding.

HOW CAN I DISCOVER IF THERE IS A HIGH LEVEL OF LEAD IN MY HOME DRINKING WATER?

You may contact your local water utility to see if it will arrange for testing for you, or will recommend a commercial laboratory. A listing of laboratories which have been certified as competent to perform lead analyses in the U.S. EPA Region 5 States, is attached to this fact sheet.

HOW CAN I PREVENT MY FAMILY FROM INGESTING HIGH LEVELS OF LEAD IN DRINKING WATER ?

- a) Use only cold water for drinking, cooking, and preparing baby formula.
- b) If water has not been run in your home, school or business for several hours, turn on the cold water tap and allow the water to run until you feel it has become as cold as it will get. This will remove or flush the water which has been standing in the pipes.
- c) Home water softeners normally should not be connected to the cold water piping, because soft water will be much more corrosive to any lead that may be present in the plumbing system. A separate pipe can be installed for cooking and drinking, or the softener can be installed to include only hot water processing.
- d) Place a pitcher of water in the bedroom, bathroom, or refrigerator for members of the family who get up in the night for a drink of water.
- e) Be sure children understand the importance of allowing water to run until the temperature changes before drinking.

WHAT IS BEING DONE TO REDUCE LEAD CONTAMINATION IN DRINKING WATER?

Your local water utility can implement some treatment procedures which will help slow or prevent lead contamination in your private plumbing system. Stabilization is a process that keeps the composition of water at a level which prevents both corrosion and excessive depositing of chemicals in the distribution system.

Many public water systems practice stabilization for water quality control and to extend the life of equipment and distribution system mains, pipes, and valves. Also, pH levels can be adjusted to allow a light coating of calcium carbonate to form on pipes and plumbing within the distribution system. This coating will help prevent corrosion, thus minimizing the amount of lead which will dissolve into drinking water.

Questions about steps being taken should be referred to your local water utility manager.

WHO REGULATES PUBLIC WATER SUPPLY SYSTEMS?

Under the Safe Drinking Water Act, U.S. EPA's Office of Drinking Water in Washington, D.C. has the responsibility to assure safe drinking water to customers of public drinking water supplies.

CAN I PURCHASE A WATER TREATMENT DEVICE TO REMOVE LEAD FROM MY HOME DRINKING WATER SYSTEM?

Carbon filters, sand filters, and cartridge filters do not remove lead or prevent corrosion of your plumbing system.

Reverse osmosis and distillation units will remove lead from drinking water. THESE UNITS CAN BE EXPENSIVE TO PURCHASE AND OPERATE, AND THEIR EFFECTIVENESS VARIES. If you choose to install a point-of-use device, be sure to check the device's capability and actual performance in removing lead. Be sure your family is aware that the other faucets within your home must be flushed prior to drinking if water has been standing.

Also, install the device close to the faucet where water is to be drawn. The water produced by these units is often quite soft and corrosive to the plumbing system.

HOW SHOULD SAMPLES BE COLLECTED FOR ANALYSIS?

If you wish to have a sample of your water tested, U.S. EPA is currently recommending that the sample be collected at a faucet where water has not been used for a period of 8 to 18 hours. A good way to collect the sample is to take the first-draw at the kitchen sink in the morning.

The sample collection container should hold about one liter. The sample should be collected immediately upon opening the faucet, and the container filled to about one inch of the top. The reason for using a one-liter container is to obtain an average of the lead content of water that is in the faucet and several feet of adjacent piping. Use a sample container furnished by the laboratory to be sure it is the correct type and is free of contamination.

HOW SHOULD ANALYSIS RESULTS BE INTERPRETED?

Current U.S. EPA regulations specify a maximum contaminant level (MCL) of 50 micrograms per liter (ug/l) when analyzed from a sampling point where water has been flushed through the building plumbing. Samples collected in this manner would not ordinarily indicate the increase in lead due to leaching from interior piping, so regulation changes are presently being proposed to require the new sampling procedure described above.

Regulation changes currently under consideration by U.S. EPA propose that the lead level in a sample that has been in contact with piping for between 8 and 18 hours should not exceed 20 ug/l.

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REGION V LABORATORIES CERTIFIED FOR LEAD ANALYSES

Compiled by U.S. Environmental Protection Agency
Region V - Chicago, Illinois
Drinking Water Section

ILLINOIS

AQUALAB - Bartlett Division
850 West Bartlett Road
Bartlett, Illinois 60103
Contact: Bill Mottashed
Phone: 312/289-3100
Certification No.: 100221

AQUALAB - Rockford Division
3548 35th Street
Rockford, Illinois 61109
Contact: Toni Gartner
Phone: 815/874-2171
Certification No.: 100220

ARDL
P.O. Box 1566
1801 West Forest Street
Mount Vernon, Illinois 62864
Contact: Ken Lee
Phone: 618/244-3235
Certification No.: 100218

Daily Analytical Laboratories
1621 West Candletree Drive
Peoria, Illinois 61614
Contact: James Dallmeyer
Phone: 309/692-5252
Certification No.: 100219

DuPage County Health Department
111 North County Farm Road
Wheaton, Illinois 61087
Contact: Lawrence Van Dyck
Phone: 312/682-7400
Certification No.: 100204

Envirodyne Engineers
12161 Lackland Road
St. Louis, Missouri 63146
Contact: Dr. Margaret Winter
Phone: 314/434-6960
Certification No.: 100217

Environmental Testing
& Certification Corporation
284 Raritan Center Parkway
Edison, New Jersey 08818
Contact: June Baker
Phone: 201/225-6741
Certification No.: 100224

Envirofact, Inc.
4790 N.W. 157th Street
Mialeah, Florida 33014
Contact: Larry Korn
Phone: 305/620-1700
Certification No.: 100223

Enviro-Test, Inc.
319 Ogden Avenue
Downers Grove, Illinois 60515
Contact: Dr. R.J. Jakubiec
Phone: 312/963-4672
Certification No.: 100186

Gulf Coast Laboratories, Inc.
2417 Bond Street
University Park, Illinois 60466
Contact: John Boudreau
Phone: 312/534-5200
Certification No.: 100201

Illinois Environmental Protection Agency
Champaign Laboratory
2125 South First Street
Champaign, Illinois 61820
Contact: Roy Frazier
Phone: 217/333-6907

Illinois Environmental Protection Agency
Chicago Laboratory
2121 West Taylor Street
Chicago, Illinois 60612
Contact: James Daugherty
Phone: 312/793-4770

North Shore Sanitary District
Russell Road, P.O. Box 750
Gurnee, Illinois 60031
Contact: Karen Farrell
Penny Bouchard
Phone: 312/623-6060
Certification No.: 100212

Sanitary District of Elgin
Post Office Box 92
Elgin, Illinois 60120
Contact: David Kaptain
Phone: 312/742-2068
Certification No.: 100190

Scientific Control
3158 South Kolin Avenue
Chicago, Illinois 60623
Contact: Frank Altmayer
Phone: 312/254-2406
Certification No.: 100183

St. Louis County Water Co.
901 Hog Hollow Road
Chesterfield, Missouri 63017
Contact: Ron Twillman
Phone: 314/469-6050
Certification No.: 100208

Suburban Laboratories, Inc.
4140 Litt Drive
Hillside, Illinois 60162-1183
Contact: Ray Thomas
Phone: 312/544-3260
Certification No.: 100225

TEKLAB, Inc.
#6 Meadow Heights Professional Park
Collinsville, Illinois 62234
Contact: Mike Austin
Phone: 618/344-1004
Certification No.: 100226

TMX, Inc.
Tenco Laboratory Division
1150 Junction Avenue
Schereville, Indiana 46375
Contact: Carl L. Andrews
Phone: 219/322-2560
Certification No.: 100210

Versar Inc.
6850 Versar Center
P.O. Box 1549
Springfield, VA 22151
Contact: Mark Carnhuff
Phone: 703/750-3000
Certification No.: 100222

Weston Analytical Laboratories
256 Welsh Pool Road
Pickering Creek Industrial Park
Lionville, Pennsylvania 19353
Contact: Dianne Therry
Phone: 215/524-0180
Certification No.: 100215

INDIANA

Environmental Laboratory Division
Bureau of Laboratories
Indiana State Board of Health
1330 West Michigan Street
Indianapolis, Indiana 46206
Contact: Craig Minshaw
Phone: 317/633-0231

MICHIGAN

Michigan Department of Public Health
Bureau of Laboratories and Epidemiological
Services
3500 North Logan Street
Lansing, Michigan 48909
Contact: Dr. Theodore Williams
Phone: 517/335-8184

MINNESOTA

Minnesota Department of Health
Division of Public Health Laboratories
717 S.E. Delaware Street
Minneapolis, Minnesota 55440
Contact: Ms. Jean Kahilainen
Phone: 612/623-5100

OHIO

Aqua-Tech Environmental Consultants, Inc.
P.O. Box 76, St. Rt. 100
Melmore, Ohio 44845
Contact: Mr. Gelaki
Phone: 419/397-2659

Howard Labs, Inc.
3601 South Dixie Drive
Dayton, Ohio 45439
Contact: Dr. David Howard
Phone: 513/294-6856

OHIO (cont.)

Ohio Department of Health Laboratory
Environmental Chemistry Laboratories
P.O. Box 2568
1571 Perry Street
Columbus, Ohio 43216
Contact: Ralph Weigelt
Joseph Zorick
Phone: 614/421-1078 ext. 26

Stilson Laboratories
170 North High Street
Columbus, Ohio 43215
Contact: Wilson Walker
Phone: 614/228-4385

Wadsworth/Alert Laboratories, Inc.
P.O. Box 208
1600 Fourth Street
Canton, Ohio 44701
Contact: Jack Guster
Phone: 216/454-5809

WISCONSIN

Davy Laboratories
P.O. Box 2076
La Crosse, Wisconsin 54601
Contact: Paul Harris
Phone: 608/782-3130
Certification No.: 632021390

Northern Lake Service, Inc.
400 North Lake Avenue
Crandon, Wisconsin 54520
Contact: Thomas E. Herman
Phone: 715/478-2777
Certification No.: 721026460

RMT, Inc.
1406 East Washington Avenue
Madison, Wisconsin 53703
Contact: Paul Duranceau
Phone: 608/255-2134
Certification No.: 113138520

State Laboratory of Hygiene
465 Henry Mall
Madison, Wisconsin 53706
Contact: Dr. William Sonzogni
Phone: 608/262-8062
Certification No.: 113133790

Enviroscan
303 West Military Road
Rothschild, Wisconsin 54474
Contact: James Barr
Phone: 715/359-7226
Certification No.: 737053130

Note: The analyses for required compliance monitoring by a public water system must be done by a laboratory that has been certified by U.S.EPA or a State Certification Officer. Individual homeowners who wish to have their drinking water tested for lead are not required to use a certified laboratory. Additional local laboratories that are capable of performing lead analyses may be found by referring to the telephone yellow pages.